ABSTRACTS
SHELL MICROSTRUCTURE SYMPOSIUM

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SHELL MICROSTRUCTURE AND MINERALOGY OF TWO SPECIES OF BIVALVES FROM DEEP-SEA HYDROTHERMAL VENTS. Richard A. Lutz, Rutgers University, New Jersey.

The mineralogies and microstructures encountered within the shells of the two species of bivalves found to date at deep-sea hydrothermal vents along the Galapagos Rift and at sites located along the East Pacific Rise are typical of calcified structures encountered within their respective families (Vesicomyidae and Mytilidae). The shell of the large, white vesicomyid (*Calyptogena magnifica*) is entirely aragonitic. Four major shell layers have been recognized in this clam and may be classified, from the often-corroded shell exterior inwards, as: 1) homogeneous; 2) predominantly fine complex crossed lamellar with patches of irregular complex crossed lamellar; 3) irregular prismatic (pallial myostracum); and 4) cone complex crossed lamellar. The calcified layers of the presently unclassified mytilid from both the Galapagos Rift site and the recently-discovered vent fields at 13°N consist, from the vacuolated periostracum inwards, of: 1) fibrous prismatic calcite; 2) nacre (aragonite); 3) irregular prismatic aragonite (pallial myostracum); and 4) nacre (aragonite).

All examined specimens of both species were sampled from depths between 2000 and 3000 m. Such depths are well above reported calcite compensation depths in these eastern Pacific regions but substantially below the reported calcium carbonate compensation depths for aragonite in these areas. While the thin veneer of calcite and the relatively thick organic periostracum appear to effectively prevent substantial dissolution of the relatively thin and fragile shell of the mytilid throughout its life, no such protection is afforded by the aragonite of the outer shell of the vesicomyid. It is suggested that extremely rapid shell deposition must be occurring throughout the life of the clam in order to "offset" destructive dissolution processes.

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DAHLLITE IN THE PERIOSTRACUM OF *LITHOPHAGA NIGRA* (MOLLUSCA: BIVALVIA) AND ITS TAXONOMIC AND FUNCTIONAL IMPLICATIONS. Thomas R. Waller, Department of Paleobiology, Smithsonian Institution, Washington, D.C.

The outer side of the dark brown periostracum of the non-incrusted boring mussel, *Lithophaga nigra* (Orbigny), turns chalky white in bleach (2% NaOCl) and leaves a bleach-insoluble residue. Scanning electron microscopy (SEM) of bleached and unbleached periostracum revealed a distinctive mineralized outer layer packed with columnar hexagonal crystals with flat ends. The crystals, which reach 0.8 μm in length and 0.2 μm in diameter, are calcium hydroxyl-apatite with an X-ray diffraction pattern like that of dahllite as reported by Watabe (1956: *Science*, 124) in the prodissoconch I of *Pinctada martensi* (Dunker). The mineralized layer of *Lithophaga nigra* is underlain by typical unmineralized periostracum, and both the mineralized and unmineralized layers originate in the periostracal groove of the mantle.

Bleach tests and SEM showed that a nearly identical mineralized outer layer is also present in the periostracum of other non-incrusted species of *Lithophaga* but is absent in the periostracum of species covered by calcareous (calcitic and/or aragonitic) incrustations. Calcareous incrustations and the mineralized outer periostracal layer are not homologous, because the former do not originate in the periostracal groove but rather are secondary deposits formed within mucus on top of the fully formed periostracum.

Wilson (1979: *Records of the Australian Museum,* 32) found several major anatomical differences between incrusted and non-incrusted *Lithophaga* in Queensland and suggested that if further studies of additional species sustain the intergroup differences, two genera should be recognized. The available names would be *Lithophaga* Röding, 1798, for the non-incrusted group and *Leiosolenus* Carpenter, 1856, for the incrusted group. The differences in periostracal structure between the two groups reported here give further support for this generic level separation. Incrustations and phosphatized periostracum may represent two independent adaptations to life in chemically excavated boreholes. In non-incrusted *Lithophaga,* dahllite may harden the periostracum and protect it against abrasion as the bivalve moves within its borehole. Thick calcareous incrustations may serve the same purpose, but in addition they strengthen and protect the exposed posterior end of the shell.

MICROSTRUCTURE OF THE CALCIFIED BYSSUS OF *ANOMIA SIMPLEX*. Robert S. Prezant, University of Southern Mississippi, Hattiesburg.

The calcified byssus of the common jingle shell *Ano-*